

UNITED STATES PATENT APPLICATION

for

METHOD AND APPARATUS FOR AUTOMATED PERSONALITY TRANSFER
FOR A WIRELESS ENABLED HANDHELD DEVICE

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METHOD AND APPARATUS FOR AUTOMATED PERSONALITY TRANSFER
FOR A WIRELESS ENABLED HANDHELD DEVICE

BACKGROUND OF THE INVENTION

5 FIELD OF THE INVENTION

The present invention relates to the field of restoring electronic devices to an operational condition. More specifically, the present invention relates to system backup for electronic devices for later restoration due to device failure.

10 RELATED ART

As the components required to build a computer system have reduced in size, new categories of computer systems have emerged. One of the new categories of computer systems is the "palmtop" computer system. A palmtop computer system is a computer that is small enough to be held in the hand of a user and can therefore be "palm-sized." Most palmtop computer systems are used to implement various personal information management (PIM) applications such as an address book, a daily organizer, scheduling calendar, and electronic notepads, to name a few. Palmtop computers with PIM software have been known as Personal Digital Assistants (hereinafter referred to as "PDAs").

25 In addition to PIM application features, some PDAs also include internal radio devices allowing connection to wireless

communication networks. Enabling a PDA with wireless capabilities provides features not normally found on a PDA, including but not limited to, wireless internet access and wireless communication (e.g., cell phone communication).

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Operation of the radio device within a PDA requires extensive calibration procedures within controlled environments upon manufacturing. These calibration procedures result in defining operational parameters required for operational use of the radio device. Additionally, the operational parameters may be unique to each radio device. In a sense, each radio device has a personality that can be defined as an aggregate of data or information that is both unique to the device and critical to the proper functioning of the radio device. That is, the personality defines an operational state of the electronic device.

Some information that define a personality of a device include device serial numbers, radio calibration parameters, performance history, and wireless network identities. For example, the radio calibration parameters allow the specific radio device to operate within a standard spectrum of operating frequencies. Each radio device operates using a radio crystal that provides a frequency component depending on the dimensional characteristics of the crystal. The frequency component may or may not fall within the standard spectrum of operating frequencies. However, calibrating the various radio

parameters (e.g., baseline and gain parameters) alters the frequency component to allow the radio to operate within the standard operating frequencies.

5 Furthermore, the radio crystal experiences a degradation in its frequency component over time due to crystal relaxation. This relaxation shifts the frequency component of the radio crystal causing the radio device to change its operating frequency. As a result, the original radio calibration
10 parameters no longer correctly adjust the frequency component to allow the radio to operate within standard operating frequencies. Therefore, periodically each radio device undergoes a recalibration procedure that determines the degree of degradation. A performance history can be stored that
15 allows the radio device to further adjust its frequency component for proper compliance with the standard operating frequencies.

The personality of the device is stored in memory,
20 typically a non-volatile read only memory (ROM). Under normal operating conditions, the personality information contained within the ROM memory cannot be rewritten, altered, or compromised. However, should the ROM memory fail, retention of the personality information contained within the ROM memory is
25 impossible.

Many of the functions of the PDA will be retained upon replacing the ROM memory upon failure and reloading the operating system at a maintenance depot. Operating parameters used for conventional features of the PDA are homogeneous throughout a class of PDAs. Replacement of these parameters can be easily accomplished without any degradation in operating performance. However, the radio device cannot operate properly without incorporating the unique information that defines its operational state or personality. Since this information is lost and not readily obtained, the radio features of the PDA are rendered inoperable.

One solution would be to recalibrate the radio device contained within the PDA. This could be accomplished by either providing calibration machinery to the maintenance depot or sending the repaired PDAs to the manufacturing plant for recalibration.

However, cost issues preclude recalibrating the repaired PDAs. First, it is cost prohibitive to provide expensive calibration equipment to the maintenance depot. Second, the cost of recalibrating the radio device at the manufacturing plant exceeds any profit from or cost of the original equipment. In other words, repair costs in calibrating the radio device could approach replacement costs making it more economical to the user to simply replace the damaged PDA with an updated PDA. Third, since a repaired PDA has left the clean

environment of the manufacturing plant, the repaired PDA will contaminate the controlled environment used for calibrating radio device, ultimately precluding any recalibration of the failed radio device.

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Another method that was previously employed in test environments required manual back ups of the information that define a personality of the device. Should the device fail, a common occurrence and objective in testing environments, the personality of the radio device could manually be re-entered into the device. However, this procedure is time consuming and extremely error prone due to human involvement.

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A procedure implemented for manually backing up a radio device could take more than three hours to complete. Not only is this time intensive, but human error is inevitable in reading the personality information, manually writing down the information, and then manually inputting the personality information back into the PDA.

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Thus, previous methods and systems could not easily or economically restore operational parameters necessary for using a radio device contained within a handheld computer that has been repaired.

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SUMMARY OF THE INVENTION

Embodiments of the present invention disclose a method and system for automated personality transfer for a wireless-enabled handheld device. One embodiment of the present invention provides for easily restoring operational parameters necessary for using a radio device contained within a handheld device. Another embodiment of the present invention provides the above need and further provides economical restoration and recycling of wireless capabilities contained within damaged handheld devices. Still another embodiment provides the above accomplishment and further provides for easy archiving of the operational parameters.

These and other objects and advantages of the present invention will no doubt become obvious to those of ordinary skill in the art after having read the following detailed description of the preferred embodiments which are illustrated in the various drawing figures.

Specifically, embodiments of the present invention disclose a method and system for automated personality transfer in a wireless enabled handheld device. In one embodiment, the present invention automatically extracts personality information that is unique and critical to the proper functionality of an electronic device. The information includes critical operating parameters necessary

for configuring the handheld device for wireless capabilities.

A personality file containing the personality information is created and stored on the electronic device. The personality file can be then transferred to another electronic device for archival purposes. An exporting feature of a personality application accomplishes the creation of the personality file.

Thereafter, should the personality information be lost due to device failure, embodiments of the present invention provide for restoring the handheld device back to its original operating state by importing the personality information back into the handheld device. Restoration of failed devices to their original operating state is accomplished by an importing feature of the personality application.

To import the necessary personality information or operating parameters that allow an electronic device return to its original operating state, one embodiment of the present invention automatically searches for all files containing personality information that are stored in the handheld device. These files are of a particular format, such that the personality application searches by looking for files following the particular file format. After device

failure, the particular file associated with the handheld device may have been archived, relocated, and downloaded back into the handheld device.

- 5 The import feature of the personality application lists the located files and presents them to a user. The personality application acknowledges selection of a file by the user. Data contained within the selected file is then imported into the handheld device. Thereafter, the handheld device is restored
- 10 to its original state and ready for operation.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A illustrates a block diagram of a first exemplary network environment including a handheld electronic device in accordance with an embodiment of the present invention.

Figure 1B illustrates a block diagram of a second exemplary network environment including a handheld electronic device coupled to other computer systems and the Internet via a cradle device in accordance with an embodiment of the present invention.

Figure 2A is a top side perspective view of a handheld electronic device that can be used as a platform for embodiments of the present invention.

Figure 2B is a bottom side perspective view of the handheld electronic device of Figure 2A, in accordance with one embodiment of the present invention.

Figure 3 is a perspective view of the cradle device for connecting the handheld electronic device to other systems via a communication interface, in accordance with one embodiment of the present invention.

Figure 4 is a logical block diagram of the handheld electronic device, in accordance with an embodiment of the present invention.

5 Figure 5 is a table listing exemplary personality information that are unique to a handheld electronic device, in accordance with one embodiment of the present invention.

10 Figure 6 is a front view of a handheld electronic device illustrating the display screen, and a generalized form of a personality application showing the importing and exporting features, in accordance with one embodiment of the present invention.

15 Figure 7 illustrates a data-flow diagram illustrating the flow of information for the computer applications used to export personality information, in accordance with one embodiment of the present invention.

20 Figure 8 illustrates exemplary contents of a personality file that contain personality information pertinent to operating a handheld electronic device, in accordance with one embodiment of the present invention.

25 Figure 9A illustrates a front view of a handheld electronic device illustrating the display screen, and a generalized form of a personality application showing a list of

possible personality files suitable for importing into the handheld electronic device, in accordance with one embodiment of the present invention.

5 Figure 9B illustrates a front view of a handheld electronic device illustrating the display screen, and a generalized form of a personality application showing the selection of one personality file for importing into the handheld electronic device, in accordance with one embodiment
10 of the present invention.

 Figure 10 is a flow diagram illustrating steps in a computer implemented method for exporting personality information for a handheld electronic device, in accordance
15 with one embodiment of the present invention.

 Figure 11A is a flow diagram illustrating steps in a computer implemented method for archiving personality information for a handheld electronic device, in accordance
20 with one embodiment of the present invention.

 Figure 11B is a flow diagram illustrating steps in a computer implemented method for importing personality information for a particular handheld electronic device, in
25 accordance with one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the preferred embodiments of the present invention, an automated personality transfer for a wireless enabled handheld electronic device, examples of which are illustrated in the accompanying drawings. While the invention will be described in conjunction with the preferred embodiments, it will be understood that they are not intended to limit the invention to these embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be included within the spirit and scope of the invention as defined by the appended claims.

Furthermore, in the following detailed description of the present invention, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be recognized by one of ordinary skill in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuits have not been described in detail as not to unnecessarily obscure aspects of the present invention.

NOTATION AND NOMENCLATURE

Some portions of the detailed descriptions which follow are presented in terms of procedures, steps, logic blocks, processing, and other symbolic representations of operations on

data bits that can be performed on computer memory. These descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. A
5 procedure, computer executed step, logic block, process, etc., is here, and generally, conceived to be a self-consistent sequence of steps or instructions leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these
10 quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a computer system. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.
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It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to
20 these quantities. Unless specifically stated otherwise as apparent from the following discussions, it is appreciated that throughout the present invention, discussions utilizing terms such as "accessing," "processing," "computing," "translating," "calculating," "determining," "scrolling," "displaying,"
25 "recognizing," or the like, refer to the action and processes of a computer system, or similar electronic computing device. These actions and processes manipulate and transform data

represented as physical (electronic) quantities within the
computer system's registers and memories into other data
similarly represented as physical quantities within the
computer system memories or registers or other such information
5 storage, transmission or display devices.

EXEMPLARY PALMTOP COMPUTER SYSTEM PLATFORM

The present invention is compatible with any electronic
device requiring restoration of operational parameters
10 necessary for operating the electronic device. One of the
common types of electronic systems which can be used in
accordance with one embodiment of the present invention is
referred to as a personal digital assistant (PDA), or commonly
called a portable computer system, which may be a PDA.
15 Reference to these electronic systems as handheld electronic
devices or handheld device is also made in this specification.
The PDA is a pocket sized electronic organizer with the
capability to store telephone numbers, addresses, daily
appointment, and software that keeps track of business or
20 personal data such as expenses, etc.

Furthermore, the PDA also has the ability to connect to a
personal computer, enabling the two devices to exchange updated
information, that is synchronize the information between the
25 two devices. Additionally, the PDA can also be connected to a
modem, enabling it to have electronic mail (e-mail)
capabilities over the Internet along with other Internet

capabilities. Moreover, an advanced PDA can have Internet capabilities over a wireless communication interface (e.g., radio interface). In particular, the PDA can be used to browse Web pages located on the Internet. The PDA can be coupled to a networking environment. It should be appreciated that embodiments of the present invention are well suited to operate within a wide variety of electronic systems (e.g., computer systems) which can be communicatively coupled to a networking environment, including cellular phones, pagers, etc.

Figure 1A is a block diagram of an exemplary network environment 50 including an exemplary personal digital assistant. The PDA 100 is also known as a palmtop or palm-sized electronic system or computer system, or handheld electronic device. The PDA 100 has the ability to transmit and receive data and information over a wireless communication interface (e.g., a radio interface). The PDA 100 is one exemplary implementation on which the present invention can operate. The present invention can operate on any portable electronic system or device.

In one embodiment, base station 32 is both a transmitter and receiver base station which can be implemented by coupling it into an existing public telephone network 34. Implemented in this manner, base station 32 enables the PDA 100 to communicate with a proxy server computer system 36, which is coupled by wire 35 to the existing public telephone network 34.

Furthermore, proxy server computer system 36 is coupled to the Internet 52, thereby enabling the PDA 100 to communicate with the Internet 52. It should be further appreciated that other embodiments of a communications network may be utilized in accordance with the present invention.

The data and information which are communicated between base station 32 and the PDA 100 are a type of information and data that can conventionally be transferred and received over a public telephone wire network system. However, a wireless communication interface is utilized to communicate data and information between the PDA 100 and base station 32. It should be appreciated that one embodiment of a wireless communication system in accordance with the present invention is the Mobitex wireless communication system.

Figure 1B illustrates a system 51 that can be used in conjunction with the present invention. System 51 comprises a host computer system 56 which can either be a desktop unit as shown, or, alternatively, can be a laptop system 58. Optionally, one or more host computer systems can be used within system 51. Host computer systems 58 and 56 are shown connected to a communication bus 54, which in one embodiment can be a serial communication bus, but could be of any of a number of well known designs, e.g., a parallel bus, Ethernet Local Area Network (LAN), etc. Optionally, bus 54 can provide

communication with the Internet 52 using a number of well known protocols.

Importantly, bus 54 is also coupled to a cradle 60 for receiving and initiating communication with a PDA 100 in one embodiment of the present invention. Cradle 60 provides an electrical and mechanical communication interface between bus 54 (and anything coupled to bus 54) and the computer system 100 for two way communications. The PDA 100 also contains a wireless infrared communication mechanism 64 (e.g., an infrared emitter and detector device) for sending and receiving information from other similarly equipped devices (see Figure 1B).

With reference to Figures 1A and 1B, it is appreciated that the exemplary personal digital assistant or palmtop computer system 100 can be used in network environment combining elements of networks 50 and 51. That is, as will be seen below, the PDA 100 can include both a wireless infrared communication mechanism and a signal (e.g., radio) receiver/transmitter device.

Figure 2A is a perspective illustration of the top face 100a of one embodiment of the palmtop computer system. The top face 100a contains a display screen 105 surrounded by a bezel or cover. A removable stylus 80 is also shown. The display screen 105 is a touch screen able to register contact between

the screen and the tip of the stylus 80. The stylus 80 can be of any material to make contact with the screen 105. The top face 100a also contains one or more dedicated and/or programmable buttons 75 for selecting information and causing the computer system to implement functions. The on/off button 95 is also shown.

Figure 2A also illustrates a handwriting recognition pad or "digitizer" containing two regions 106a and 106b. Region 106a is for the drawing of alphabetic characters therein (and not for numeric characters) for automatic recognition, and region 106b is for the drawing of numeric characters therein (and not for alphabetic characters) for automatic recognition. The stylus 80 is used for stroking a character within one of the regions 106a or 106b. The stroke information is then fed to an internal processor for automatic character recognition. Once characters are recognized, they are typically displayed on the screen for verification and/or modification.

Figure 2B illustrates the bottom side 100b of one embodiment of the palmtop computer system. An optional extendible antenna 85 is shown and also a battery storage compartment door 90 is shown. A communication interface 108 is also shown. In one embodiment of the present invention, the communication interface 108 is a serial communication port, but could also alternatively be of any of a number of well known communication standards and protocols, e.g., parallel, USB,

SCSI, Firewire (IEEE 1394), Ethernet, etc. It is appreciated that interface 108 can also be used for charging current when using rechargeable batteries.

5 Figure 3 is a perspective illustration of one embodiment of the cradle 60 for receiving the palmtop computer system 100. Cradle 60 contains a mechanical and electrical interface 260 for interfacing with communication interface 108 (Figure 2B) of computer system 100 when system 100 is slid into the cradle 60
10 in an upright position. Once inserted, button 270 can be pressed to initiate two way communication between system 100 and other computer systems coupled to electrical interface cable 265.

15 Referring now to Figure 4, portions of the present electronic system are comprised of computer-readable and computer-executable instructions which reside, for example, in computer-readable media of an electronic system (e.g., personal digital assistant, computer system, and the like). Although
20 the functional faceplate of the present invention can be implemented in a variety of different electronic systems such as a pager, a cell phone, a remote control device, etc., one exemplary embodiment includes the integration of the faceplate with a portable electronic device or PDA, such as PDA 100.

25 Figure 4 is a block diagram of exemplary interior components of an exemplary PDA 100 upon which embodiments of the present invention may be implemented.

Figure 4 also illustrates circuitry of an exemplary portable computer system 100. Computer system 100 includes an address/data bus 99 for communicating information, a central processor 101 coupled with the bus 99 for processing information and instructions, a volatile memory 102 (e.g., random access memory RAM) coupled with the bus 99 for storing information and instructions for the central processor 101 and a non-volatile memory 103 (e.g., read only memory ROM) coupled with the bus 99 for storing static information and instructions for the processor 101.

Computer system 100 also includes an optional data storage device 104 (e.g., thin profile removable memory) coupled with the bus 99 for storing information and instructions. Device 104 can be removable. Device 104 may also be an SDRAM card reader or equivalent removable memory reader.

Also included in computer system 100 of Figure 4 is an alphanumeric input device 106 which in one implementation is a handwriting recognition pad ("digitizer") and may include integrated push buttons in one embodiment. Device 106 can communicate information (spatial data and pressure data) and command selections to the central processor 101. The digitizer 106 records both the (x, y) coordinate value of the current location of the stylus and also simultaneously records the

pressure that the stylus exerts on the face of the digitizer pad. The coordinate values (spatial information) and pressure data are then output on separate channels for sampling by the processor 101. In one implementation, there are roughly 256
5 different discrete levels of pressure that can be detected by the digitizer 106. Since the digitizer's channels are sampled serially by the processor, the stroke spatial data are sampled "pseudo" simultaneously with the associated pressure data. The sampled data is then stored in a memory by the processor 101
10 for later analysis.

System 100 of Figure 4 also includes an optional cursor control or directing device 107 coupled to the bus for communicating user input information and command selections
15 to the central processor 101. In one implementation, device 107 is a touch screen device (also a digitizer) incorporated with screen 105. Device 107 is capable of registering a position on the screen 105 where the stylus makes contact and the pressure of the contact. The digitizer of 106 or 107 can
20 be implemented using well known devices.

System 100 also contains a flat panel display device 105 coupled to the bus 99 for displaying information to the computer user. The display device 105 utilized with the
25 computer system 100 may be a liquid crystal device, cathode ray tube (CRT), field emission device (FED, also called flat panel CRT) or other display device suitable for creating

graphic images and alphanumeric characters recognizable to the user. Any of a number of display technologies can be used, e.g., LCD, FED, plasma, etc., for the flat panel display 105. In one embodiment, the display 105 is a flat panel multi-mode display capable of both monochrome and color display modes.

Signal communication device 108, also coupled to bus 99, can be a serial port (or USB port) for communicating with a cradle. In one embodiment, the serial communication interface 108 is a serial communication port, but could also alternatively be of any of a number of well known communication standards and protocols, e.g., parallel, SCSI, Firewire (IEEE 1394), Ethernet, etc. In addition to device 108, wireless communication links can be established between the device 100 and a host computer system (or another portable computer system) using a Bluetooth wireless device 360, an infrared device 355, or a GSM radio device 240. Device 100 may also include a wireless modem device 240 and/or a wireless radio, e.g., a GSM wireless radio with supporting chipset. The wireless modem device 240 is coupled to communicate with the processor 101 but may not be directly coupled to port 108.

In one implementation, the Mobitex wireless communication system may be used to provide two way communication between system 100 and other networked

computers and/or the Internet, e.g., via a proxy server. In other embodiments, TCP protocol can be used or SMS can be used. System 100 of Figure 4 may also contain batteries for providing electrical power.

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PERSONALITY INFORMATION

A method and system are described for a handheld electronic device with wireless capabilities. A device personality consists of an aggregate of information that is both unique to the handheld electronic device and is critical to the proper functioning of the handheld device. This is especially true to enable the wireless functionality of the handheld device.

Personality information include operational parameters required for the operational use of the radio device contained within the handheld device. These operational parameters define an operational state of the handheld device and is typically discovered through extensive calibration procedures conducted within controlled environments. Furthermore, the personality information is unique to a particular handheld electronic device. If personality information from a first device were to be inserted and substituted into a second handheld electronic device, the second handheld device could continue to operate its PIM and related application not associated with its wireless capabilities. However, the

wireless capabilities of the second handheld device would be rendered inoperable.

Figure 5 illustrates a table 500 that includes, but is not limited to, personality information that are necessary to operate the wireless capabilities of a handheld device. Some information that define a personality of a device include device serial numbers and radio calibration parameters 510. The radio calibration parameters 510 adjust the frequency component of a specific radio device to operate within a standard spectrum of operating frequencies. These parameters 510, among others, help define an operational state of the handheld device, specifically the radio device contained within the handheld device.

Table 500 of Figure 5 also illustrates performance history values that help a radio device maintain its operational state. Signal processing parameters 520 and component aging state parameters 530 are recalibrated and checked periodically to adjust for degradation of the frequency component of the radio device. The performance history parameters 520 and 530 allows the radio device to further adjust its frequency component in order to maintain compliance with the standard operating frequencies. Table 500 also illustrates network identity parameters 540 that uniquely identify a handheld device with its communication network.

IMPORTING AND EXPORTING PERSONALITY INFORMATION AUTOMATICALLY FOR A WIRELESS
ENABLED HANDHELD ELECTRONIC DEVICE

Although the description of the present invention will focus on an exemplary personal digital assistant (hereinafter referred to as "PDA") or palmtop computer system, the present invention can be practiced with other electronic systems or electronic devices (e.g. personal computer systems, cellular phones, pagers, portable web devices, etc.).

Figure 6 is a front view of an electronic device (e.g., PDA 100) illustrating a screen shot 600 on the display screen 105, in accordance with one embodiment of the present invention. Screen shot 600 shows a personality application providing two options for selection by a user. This exemplary screen is presented upon launching the personality application on the electronic device. The personality application can both export and import personality information unique to the electronic device. A button 610 selects the export option where personality information located on the electronic device is located and stored into a file on the device. A button 620 selects the import option where personality information located on a file is imported into the electronic device.

In one embodiment, the personality application, once downloaded to a wireless enabled (RF enabled) PDA will read the personality of the PDA, including radio configuration data (e.g., tuning parameters, calibration parameters, and anything

else that differs from device to device). Thereafter, the flash memory containing the personality data can be replaced without loss of any functionality of the PDA, including its wireless capabilities, if these personality information were archived to a separate location. Replacement may be necessary due to a failed flash memory or because of upgrading. The personality application can then import or write back to the new flash memory the archived personality information allowing the radio in the PDA to operation with the same parameters as previously stored. The personality application facilitates returning a wireless enabled PDA to an operational state without needing expensive and time consuming re-calibration that is often only available on the original factory floor.

Figure 7 illustrates an exemplary data flow diagram for exporting personality information into a file on a electronic device, such as PDA 100, in accordance with one embodiment of the present invention. In Figure 7, after a user selects the export functionality of the personality application 710, the application 710 automatically searches and locates personality information that is critical to the proper functioning of the electronic device 100. This personality could include, but is not limited to, information such as those listed in Table 500 of Figure 5.

In Figure 7, the personality application automatically searches through each of the memory storage areas contained

within the electronic device 100. For purposes of illustration, Figure 7 shows one exemplary data flow path 730 to each of the memory devices. In Figure 7, the flow path 730 for the personality application 710 goes from the ROM memory 103 to the portable memory 104, and to the RAM memory 102, before the personality application processes the data. However, it is appreciated that embodiments of the present invention will search in any memory storage area for personality information, and that the personality application can search in any order through the memory storage areas.

It is appreciated that the personality application 710 can search, locate and fetch personality information in locked and unlocked areas of ROM memory 103. For example, the serial number of the electronic device is stored in a specific location of locked flash ROM memory 103. The personality information is capable of reading information stored in the locked flash memory, in one embodiment of the present invention.

In another embodiment, the personality application 710 searches specific areas of ROM memory (e.g., memory addresses) that contain specific items of personality information. Since all the personality information could be located in specific locations of memory, the personality application need only search in pre-determined locations to accumulate the personality information specific to the electronic device. In

another embodiment, the personality application searches for information following a specific format, such as, a marker that indicates the information is personality information.

5 The personality application 710 fetches any personality information contained within the electronic device 100 and stores the information as shown by data flow path 740. The personality information is stored in a personality file 720 that is also automatically created by the personality
10 application 710. In one embodiment, the personality information is stored after searching completely through one of the memory storage areas before searching through the other memory storage areas.

15 Thereafter, data flow path 750 shows that the personality file 720 is stored on the electronic device 100. In one embodiment, the personality file 720 is stored in RAM memory 102 of electronic device 100. The personality file could be further backed up through synchronizing, beaming, or
20 transferring through any other means to another electronic device.

Figure 8 illustrates an exemplary personality file 720 that contains personality information pertinent to operating a
25 handheld electronic device, in accordance with one embodiment of the present invention. The personality file 720 is generated after a user of the electronic device 100 has

executed the export feature of the personality application, as shown in Figure 6. The personality file 720 follows a specific format: a title, "T" records, and "P" records. The "T" and "P" records define the location of memory (e.g., the memory address) the information contained within the "T" and "P" record should be imported to in electronic device 100.

For example, the title of all personality files consists of two parts. Title 810 of file 720 shows part 813 that contains a twelve character device serial number. Title 810 also consists of part 815 that contains a date and time stamp in the following format, "YYMMDDhhmmss." Parts 813 and 815 are separated by a space in the title 810.

File 720 of Figure 8 also contains multiple "T" records, such as "T" record 820. The "T" records correspond to hardware tokens on electronic device 100. The format of the "T" record consists of the letter "T", followed by a space, followed by an eight ASCII hex character token name, followed by a space, followed by a four ASCII hex character data length, followed by a space, followed by the data bytes in ASCII hex.

File 720 of Figure 8 also contains multiple "P" records, such as "P" record 830. The "P" records correspond to non-volatile preferences on the electronic device 100. Information contained within the "P" records could be the most recent aging records obtained by the device during one of its recalibration

procedures to check the deterioration of the operating parameters. The format of the "P" record consists of the letter "P", followed by a space, followed by an eight ASCII hex character preference name, followed by a space, followed by a four ASCII hex character preference index, followed by a space, followed by a four ASCII hex character data length, followed by a space, followed by the data bytes in ASCII hex.

It is appreciated that the file format of the personality file 720 is exemplary only and that embodiments of the present invention could use other formats containing the same or similar personality information.

Figure 9A illustrates a front view of an electronic device, such as PDA 100, illustrating the display screen 105, and a generalized form of a personality application showing a screen shot 900 that provides a list of possible personality files suitable for importing into the electronic device 100, in accordance with one embodiment of the present invention. The screen shot 900 is displayed after a user of the electronic device 100 has executed the import feature of the personality application 710.

Screen shot 900 shows an instruction bar 910 that instructs the user to select one of the displayed personality files for importing into the electronic device 100. After

selection, the user taps the "Import Selection" button 940 to start the import process.

The personality application, upon execution of the import feature searches and locates all the personality files contained within the electronic device 100. As shown in Figure 8, the personality files follow a specific file format. The personality application searches for titles that follow the format illustrated by title 810 of Figure 8, namely serial number followed by a time stamp (e.g., parts 813 and 815 of title 810), in accordance with one embodiment of the present invention.

Screen shot 900 illustrates four files found on the electronic device that may contain the operational parameters pertaining the specific electronic device 100. Files 922, 924, 926, and 928 all contain personality information that pertain to electronic devices that may or may not be the specific electronic device 100 that is running the import feature of the personality application 710.

Figure 9B illustrates a front view of a handheld electronic device illustrating the display screen 105, and a generalized form of a personality application showing the selection of one personality file 922 for importing into the handheld electronic device 100, in accordance with one embodiment of the present invention. Since the titles of the

personality files 922, 924, 926, and 928 all include a serial number from the electronic device from which the personality information was exported, a user need only cross check the actual serial number of the handheld device 100 running the import operation of the personality application with each of the available personality files as displayed in Figures 9A and 9B. Typically, the serial number is conveniently located on the back of the electronic device 100. Additionally, the most recent personality file could be chosen if there are multiple personality files pertaining to the electronic device 100.

Figure 9B shows that personality file 922 was selected by the user. The list entry showing personality file-one 922 is displayed in reverse-video to indicate selection, in accordance with one embodiment of the present invention. This information or data contained within personality file 922 will be automatically imported into the electronic device by the personality application, in accordance with one embodiment of the present invention.

Figure 10 is a flow chart 1000 illustrating steps in a computer implemented method for exporting personality information for a handheld electronic device, in accordance with one embodiment of the present invention. As shown in step 1010, the present embodiment automatically extracts personality information that is unique to the electronic device. This personality information is critical to the proper functioning

of the electronic device, including the wireless capabilities of the electronic device.

In one embodiment, the personality information contains state information such as radio calibration parameters that enable the electronic device to adjust a frequency component in order to allow the electronic device to communicate over a wireless network.

As shown in step 1020, the present embodiment then creates a personality file. In one embodiment, the file is a memo file created by a memo application on the operating system of the electronic device.

As shown in step 1030, the present embodiment then automatically writes the personality information located and extracted in step 1010 into the personality file. In step 1040, the present embodiment then automatically stores the personality file on the electronic device.

As shown in step 1050, another embodiment of the present invention transfers the personality file to another electronic device for purposes of archiving. Should the memory fail containing the personality information, the personality information could be easily restored to the appropriate locations in memory by importing data contained within the archived personality file.

In another embodiment of the present invention, it is envisioned that all newly manufactured handheld electronic device undergo an exporting of their personality information using the method illustrated in embodiments of the present invention. A central archive or repository could store the personality files of each of the handheld electronic devices. Therefore, upon repairing the failed memory of the handheld electronic device, the erased personality information could be easily located in the archive and restored on the handheld electronic device. Thus, a normally inoperable radio device contained within the electronic device could be restored to its original operating state.

Figure 11A is a flow diagram illustrating steps in a computer implemented method for archiving personality information for a handheld electronic device and restoring the information on a repaired electronic device, in accordance with one embodiment of the present invention.

As shown in step 1110 of Figure 11A, the present embodiment assumes that an archived personality file for the electronic device exists. Should the electronic device fail, specifically the internal memory that contains the personality information for the electronic device to provide wireless functionality, then the personality information could be easily and economically restored. In step 1110, the present

embodiment locates the archived personality file. This file could be in a personal computer or on a central server computer accessible through numerous portholes, including the internet.

5 As shown in step 1120 of Figure 11A, the personality file specific to the failed electronic device is transferred to the device. This could be done by copying the file, beaming the file, or any other suitable transferring process.

10 As shown in step 1130 of flow chart 1100, the present embodiment then restores the personality information using the personality transfer application. Flow chart 100 continues at point A in flow chart 1150 of Figure 11B

15 Since some items of personality information may be stored in an area of locked ROM memory (e.g., locked flash memory), those areas of locked flash memory must be first unlocked. For example, the serial number of an electronic device is stored in locked flash memory so that a copying
20 device cannot easily mimic another device by simply changing its serial number in the locked flash area. This is one measure to prevent unauthorized use of the copied device's wireless airtime over the wireless communication network.

25 Figure 11B is a flow diagram illustrating steps in a computer implemented method for importing personality information for a particular handheld electronic device, in

accordance with one embodiment of the present invention. The importing of the personality information is for the purpose of restoring the operational state of the electronic device to enable its wireless capabilities. Continuing from point A in
5 Figure 11A, the present embodiment automatically locates a plurality of files that are stored in the electronic device in step 1140. The plurality of files includes the personality file created in steps 1020 and 1030, and transferred back to the electronic device in step 1120 of flow chart 1100.

10 As shown in step 1150 of Figure 1150, the present embodiment then lists all the files on a display of the electronic device. Some of the plurality of files may not pertain to the electronic device, but do contain personality
15 information pertinent to other electronic devices. Numerous files may contain personality information pertinent to the electronic device, but some may be more current or accurate than others. Selection of the one file suitable for importing into the electronic device is done by a user of the personality
20 application implementing the restoration of the electronic device.

As shown in step 1160 of flow chart 1150, the present embodiment acknowledges the selection of one of the plurality
25 of personality files. In step 1170, the present embodiment then automatically imports the data contained within the selected personality file to the electronic device. In one

embodiment, specific items of data contained within the personality file correspond to pre-determined ROM memory locations. This memory location is provided with each item of personality information. As such, the importing feature of the personality application imports each of those items into their corresponding predetermined locations.

Restoring the personality of an electronic device also restores the wireless capabilities of the device, in one embodiment of the present invention. Rather than simply foregoing the wireless capability of a device, or worse, discarding the entire device, the failed device could easily and economically be returned to its original operating state using the method as described in embodiments of the present invention.

While the methods of embodiments illustrated in flow charts 10, 11A, and 11B show specific sequences and quantity of steps, the present invention is suitable to alternative embodiments. For example, not all the steps provided for in the method are required for the present invention. Furthermore, additional steps can be added to the steps presented in the present embodiment. Likewise, the sequences of steps can be modified depending upon the application.

The instructions for the steps, and the data input and output from the steps of flow charts 10, 11A, and 11B may be

implemented utilizing processor 101 and ROM memory 103 and RAM
memory 102, as shown in Figure 4. Furthermore, other types of
memory storage can be utilized to accomplish the aforementioned
such as a hard drive, a CD ROM, flash memory, or any compact
5 integrated circuit memory storage device.

The preferred embodiment of the present invention, a
method and system for importing and exporting directory and
calendar information to and from personal information
10 management computer applications, is thus described. While the
present invention has been described in particular embodiments,
it should be appreciated that the present invention should not
be construed as limited by such embodiments, but rather
construed according to the below claims.